Cressy. (N.)

SYNOPSIS OF LECTURE

ON

THE DENTITION OF DOMESTIC ANIMALS,

DELIVERED AT THE MEETING OF THE STATE BOARD OF AGRICULTURE, AT WESTFIELD, MASS., DECEMBER 3, 1874.

BY PROFESSOR NOAH CRESSY, M. D.

DENTITION OF DOMESTIC ANIMALS.

The teeth belong to the digestive system; and though firm, hard substances, and even implanted in the maxillary bones, yet they are no part of the osseous skeleton. They are developed from the mucous membrane along the walls of the anterior portion of the alimentary canal, and thus serve as the mechanical agents in the division and the trituration of the food. The teeth are therefore adapted in the carnivorous animals for seizing and tearing flesh; while in the herbivora, there is a modified form of the same, to suit the changed condition of the creature in nature. In fact, almost every conceivable gradation of purpose may be served by these important organs in the economy of the different orders, genera and species of mammals.

In the walrus or sea-cow, we find a pair of tusks developed to such an extent that they are used as organs of locomotion when the creature is basking upon the shore; and the fossil dinotherium of the tertiary epoch evidently used a similar pair of the front teeth on the lower jaw as a means of anchorage.

The beaver, like the carpenter with his tools, diligently applies his gnawing teeth to the wood, and thus prepares and by the same means transports his building material for his dam.

The elephant and the musk-deer have well-developed teeth, that are employed as organs of defence, while the hyena and the dog show their glistening ivory when in rage, and use the same as weapons of combat. But nowhere is the secondary use of the teeth more evidently displayed than in man, where they not only contribute to beauty, but to his inimitable power of speech.

Hence the teeth are important in a zoölogical point of view, and greatly aid in the classification of animals. So intimate are the relations of these organs to the general economy and habits of an individual, that the naturalist is often enabled to determine the position of a fossil creature in the scale of being by the teeth alone; and not unfrequently these are the only relics to be found to mark the existence of some huge monster, whose bony skeleton perhaps may have smouldered away to dust.

The teeth are composed of three distinct anatomical elements,—the dentine, the enamel, and the crusta petrosa. The first was so named by Professor Richard Owen, of London, in 1835. It forms the bulk of the tooth, and is very firm and solid. Hence it has been called the bone of the tooth. A modified form of it, as seen in the tusks of the elephant, is called *ivory*. It is made up of a series of minute tubes and cells, with earthy particles interposed. The dentine of the higher mammals is unvascular, but its nutrition is carried on by means of these tubes connecting with the pulp.

The enamel is the hardest substance in the animal body, and consists of earthy matter deposited in an organized matrix. The enamel forms a perfect sheath around the dentine, except on the lower portion of the root. In man and the carnivorous animals it permanently covers the crown, but in the herbivora, where the teeth are long and gradually wear away, it soon becomes denuded. Here it takes on a new form, being folded upon itself, and in the grinding teeth it presents a peculiar appearance, interspersed with dentine. In the front teeth of the horse it forms a deep cavity, as seen in figure 2, and is known as the infundibulum.

The crusta petrosa is a hard, bone-like substance, which covers that portion of the tooth within the jaw. In its structure and manner of growth it resembles the osseous tissue more than either of the other dental elements. It varies greatly in thickness on different teeth and on different parts of the same tooth. It is the thickest at the end of the fang; and where it covers the enamel it appears like a thin layer of cement, which name also has been applied to it by various authors. It fills the bottom of the infundibula, and forms an oval island in the sack of the enamel, which is well illustrated

in comparing figures 2 and 3. As the teeth wear away, the nerve begins to recede from the crown, and its cavity is filled with cement. This makes the "dental star," as shown in figure 4.

There is great variety in the form and number of teeth among our domesticated and wild animals, and we are therefore led to inquire what relation one kind of dentition has to another. Zoölogists and palæontologists are agreed that the typical set of mammalian teeth is forty-four. This corresponds with the number found in the fossil skull of the dotherium, as shown in figure 1. Professor Owen and other naturalists claim that the hog is the only creature now in existence that has a complete set. But there is evidently some mistake about the dentition of the *Suidæ*, as I shall endeavor to show at another time.

Anatomists have divided the teeth into certain series, as follows: the first three in front on each side are called from their shape, incisors; the next one is the canine; then comes the four premolars; and lastly the three molars, as here represented.

Incisors, $\frac{3}{3}\times\frac{3}{3}$; canine, $\frac{1}{1}\times\frac{1}{1}$; premolars, $\frac{4}{4}\times\frac{4}{4}$; molars, $\frac{3}{3}\times\frac{3}{3}=44$. This formula shows the teeth to be equally divided above and below and upon the right and left side. But all animals do not possess this number. Man has only thirty-two, and in comparing them with the typical set, we discover that the outer incisors in both jaws are lost; the canines are in place, and so are the molars; but of the four premolars only two are present, and these are known as the bicuspids. In the horse and ruminants we find the molars and three of the premolars present, and not unfrequently the first milk molar in a rudimentary form, which may be called a supernumerary. This is always present as a germ in each jaw, as will be seen in the formulæ for the deciduous teeth of the horse and ox.

Incisors, $\frac{3}{3}\times\frac{3}{3}$; canines, $\frac{1}{1}\times\frac{1}{1}$; molars, $\frac{4}{4}\times\frac{4}{4}=32$.

This peculiar denticle is known among horse jockeys as the "wolf-tooth," and special pains are usually taken to remove it at an early date, lest it cause blindness or some other ophthalmic trouble. Such practice, based on imaginary pathology, cannot be too strongly denounced by every

anatomist in the land. The occasional presence of this diminutive tooth with the permanent set only illustrates the law of reversion, and should be looked upon in a zoölogical, rather than in a pathological, point of view. It is curious that the farriers of the county, who have almost invariably, they claim, found this to be so very troublesome in the horse, have not stopped to inquire whether similar diseases did not exist among the ruminants, where these wolf-teeth are quite as prevalent.

Prof. Joseph Leidy, M. D., of Philadelphia, has found, in his palæontological researches concerning the extinct mammalian fauna of Dakota and Nebraska, that the *Anchitheridæ* (a large family of solipeds, now found fossil in the Mauvaises Terres) had six large molar teeth on each side of both jaws, besides a small premolar, as in the horse. Hence, the wolf-tooth becomes an interesting relic in the study of natural history. And the various diseases of the eye, supposed to be caused by this little nerveless tooth, must have prevailed throughout a long geological period when there were no veterinarians to attend to the sanitary condition of these afflicted animals, if such they were, from the possession of this offending tooth.

In the bovines, the number of teeth is reduced to thirty-two, inasmuch as there are no incisors nor canines in the upper jaw in the second dentition. Yet germs of these teeth are in place, though not developed in the first set.

The canines appear in the musk-deer and in the caribou, and the outer incisors also occur in the camel.

As the milk-teeth are gradually replaced by those of the permanent set, at different intervals in different species of animals, we are enabled to determine the comparative age of a creature in its early years, if we know the order of its dentition. And the teeth which are of the most importance to the practical observer are the incisors and the canines on the lower jaw.

The colt has the six incisors well developed and in position at one year of age. The infundibula or "the marks," seen at figure 2 in the crown of the front teeth, are well defined. But at two years of age these cavities have become nearly, if not quite, worn out; and, if a colt at this age is very large

and well developed, it may be taken for a horse much older, by one not experienced in such dental examinations. But any one with half an eye, though deceived in regard to the *marks*, can see that the creature is still a colt.

At three years of age, the central nippers are replaced by the permanent teeth, which are much wider and more bulky than the remaining ones of the milk set. The lateral nippers come at four, and the permanent corner nippers appear when the horse is five years old, and seldom or never before that time.

This is an important age to observe the condition of the mouth; for not unfrequently a large four-year-old colt is offered for sale as a five-year-old horse, for family use, and one not familiar with the order of dental development would be deceived and "sold" by a sharp horse jockey. Before you pay any money for a horse represented to be five years old, see that the milk-nippers, which are very small compared with the other front teeth, have been replaced by the "horse-teeth," so called.

The canine or "bridle-teeth," though always present as a germ, are usually not very much developed in the mare, and therefore of no importance to decide this question, but in the horse they are much more prominent at five, than a year previous. There are but few cases, I fancy, of horses absolutely five years old, that have not shed their corner milk-teeth. But if the matter is pressed, call for an authentic record in all such disputed cases.

At six years of age, the "marks" in the first incisors have usually disappeared, and at seven, the same change has occurred in the lateral nippers, and repeated in the corner teeth at eight. Thus, when a horse is going on nine years old, all the "marks" have usually disappeared from the lower front teeth. From this age onward, the teeth become thinner in their lateral diameter, as also much shorter. At figure 3, is seen the left middle incisor at about twelve years of age; and at figure 4, the same tooth from the jaw of a horse twenty-seven years of age and represented in full at figure 12, which is actually drawn from nature. I know the history of this horse: it belonged to the late Michael Griffin, of Middletown, Conn., and I obtained this specimen with my own hand, from

the carcass. You will see that this old horse's tooth is much shorter than the one at twelve years of age, and not half as wide. Thus you will find a serial gradation in the length and width of the lower incisors, from eight to extreme old age. The older the horse, the shorter the teeth, even though they show longer above the gum than in a younger animal.

From the foregoing it will be seen that the first pair of permanent incisors occur in the colt at three years of age, and the others at intervals of one year. The "marks" disappear according to the same law. But in the ox we have another order of dentition. Here, the first pair of the second set occur at two, and the others, including the canines, which thus make eight front teeth, at intervals of six months. To verify this, I have watched the dental development of the thoroughbred stock at the College barn, and have had Professor S. T. Maynard sketch the following figures from living animals, that may be examined at any time by all who are interested in this branch of inquiry.

"Yucatan," a Shorthorn heifer, is now two years old, and has the first pair of permanent teeth up and well developed. (See figure 5.)

Another heifer of the Shorthorn breed, "Bella Wilfer," now two years and a half old, has four incisors, as shown in figure 6.

"Grand Duke," one of the Jersey bulls, had the six incisors well developed last fall, when three years of age, as seen in figure 7.

The Ayrshire bull, "Lord Ronald," has now a full mouth at three and a half years old. (See figure 8.)

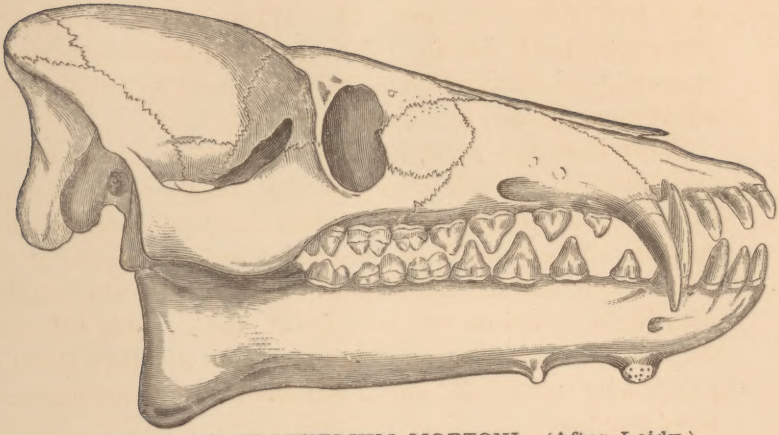
These all occur in the regular order of dentition, but there is occasionally a slight variation. "Fourth Highland Chief," a bull of the Holstein breed, is a little tardy in his dental development, according to this rule. He will not have a full mouth until four years of age, as seen in figure 9.

The teeth grow smaller as the creature advances in years. This is well illustrated by comparing the appearance of the jaw of old "Beauty" (figure 10) with any of the other figures. There are at times very early developments of the teeth, when the jaw-bones are not large enough to contain them. This causes great irregularity in the position of the milk set,

as is well shown in figure 11. When this is the case, the permanent teeth usually follow in rapid succession, and if crowded, one should be removed to prevent its being broken off at an early age, in the act of grazing.

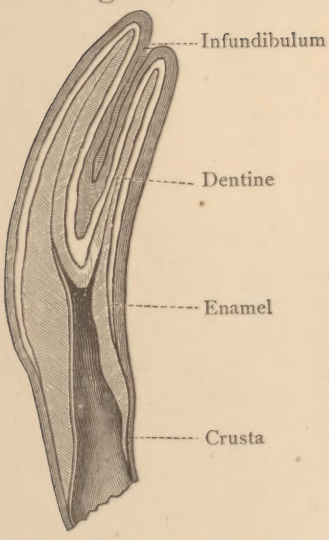
Sheep have the same number of teeth as cattle, and the appearance of the jaw is very similar, but the order of dentition is in accordance with another law, peculiar to every species. The first pair of permanent incisors appear at one year of age, and the rest follow at an interval of nine months, with slight variations for exceptional cases. This will make the next two appear at one year and nine months; the third pair at two and a half, and a full mouth at three years and three months.

Fig. 1.



SKULL OF ELOTHERIUM MORTONI. (After Leidy.)

Fig. 2.

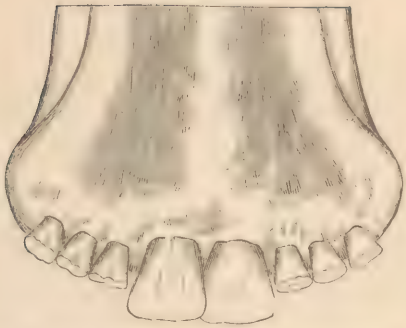


Section of Incisor of Horse.

Fig. 4.

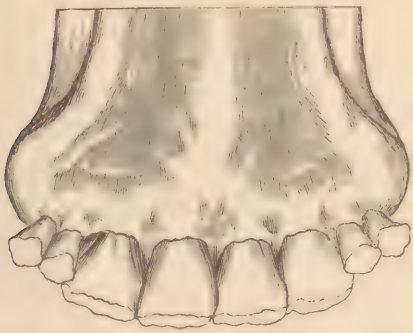
Fig. 3.

No. 5.



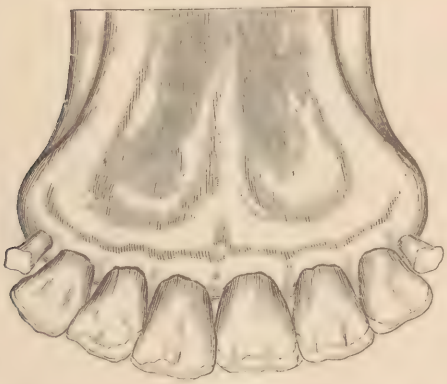
YUCATAN, (Shorthorn,) 2 years old, March 19, 1875.

No. 6.



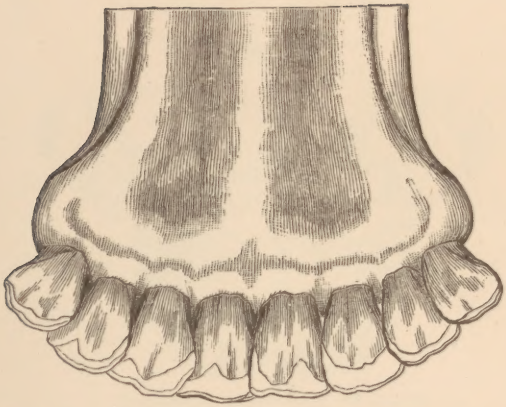
BELLA WILFER, (Shorthorn,) 2½ years old, March 20, 1875.

No. 7.



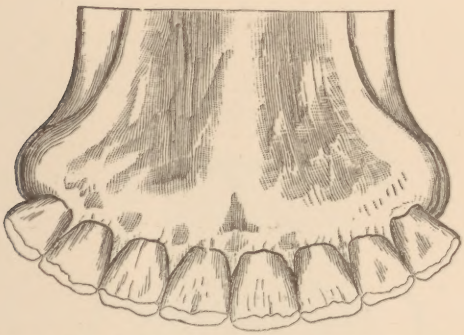
GRAND DUKE, (Jersey,) 3 years old, Sept. 24, 1874.

Fig. 8.



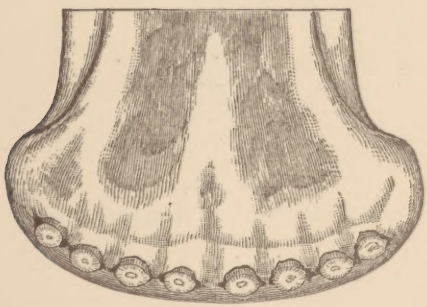
LORD RONALD, (Ayrshire,) 3½ years old, March 26, 1875.

Fig. 9.



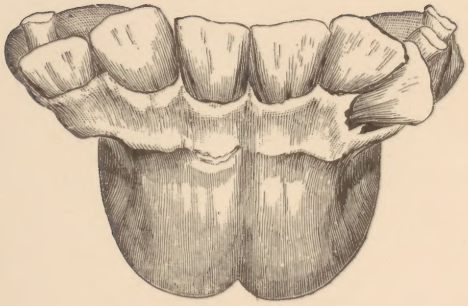
FOURTH HIGHLAND CHIEF, (Holstein,) 4 years old, May 15, 1875.

Fig. 10.



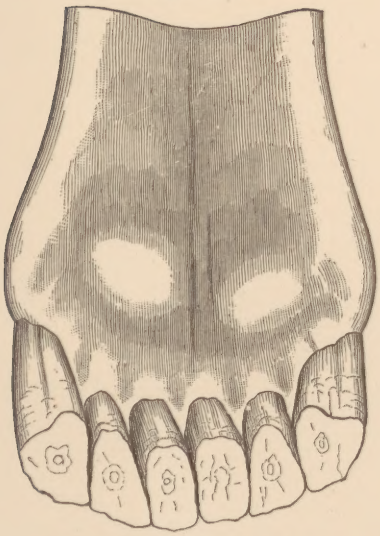
BEAUTY, No. 8, (Ayrshire,) 21 years old.

Fig. 11.



Irregular Dentition of Cow.

Fig. 12.



Lower Incisors of Horse, 27 years old.